National Infrastructure Simulation & Analysis Center

N-ABLE

NISAC Agent-Based Laboratory for Economics

What is N-ABLE?

- N-ABLE is an in-development, high-fidelity, economic-consequence management tool designed to model the microeconomic impacts of infrastructure usage, disruption, and loss mitigation.

- Economic vulnerabilities determined by high-level tools such as macroeconomic analysis often do not provide the microeconomic detail necessary (1) to understand the mechanics of how economic firms and households use infrastructure and are affected by infrastructure disruptions, and (2) to estimate the total microeconomic and macroeconomic impacts of potential new industry/government infrastructure policies.

- N-ABLE's modular microeconomic structure allows for detailed analyses of complex economic processes, ranging from single markets to entire economic regions.

Infrastructures/sectors in N-ABLE development

Infrastructure/sector	Geographic Scope
ElectricPower	Regional/National
Telecommunications	Regional/National
Manufacturing	Regional/National
Transportation	Regional/National

N-ABLE Collaborative Development Team

N-ABLE Development Lead	Mark Ehlen
User Interface Development	Drew Bowker, Mark Bastian, Mike Procopio
Software Development Lead	Eric Eidson
Agent/Simulation Architecture	Dianne Barton, John Britanik, Dave Schoenwald, Andy Scholand
Analysis	Natasha Slepoy

External collaboration: Argonne National Laboratory, National Imagery and Mapping Agency, Lucent Technologies, Policy Analysis Corporation, University of Washington

Agent Architecture

N-ABLE microeconomic agents have internal cellular structure that allows for detailed modeling of economic firms and households and in particular their usage of electric power, telecommunications, and transportation infrastructure

N-ABLE model structure: the economic firm
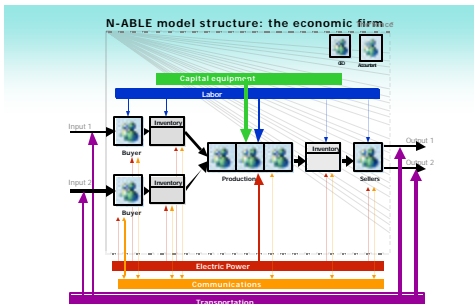
Simulation Architecture

Modular simulation architecture based on MPI, Web Services, and server-client technologies allows for combining heterogeneous economic/infrastructure simulations and algorithms into one 'virtual' simulation.
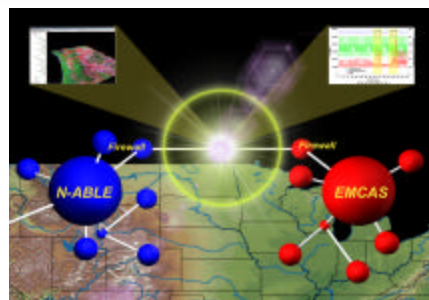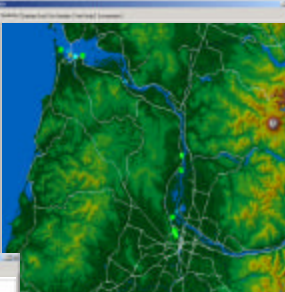

User Interface

The User Interface provides the means for assembling, conducting, and analyzing the results of parameterized and experimental simulations.
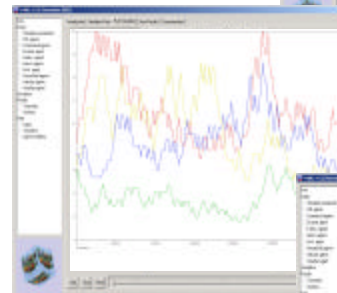

User selects economic regions, infrastructures, and commodities in supply chain

Simulation creates synthetic firms that use infrastructure, produce, buy, sell, and ship commodities

Simulations help detect how and which firms are more likely to weather disruptions…

… supporting assessments of potential government and industry infrastructure policies.